

JEWISH WOMEN IN SCIENCE

WIN THE NOBEL PRIZE



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INTRODUCTION

The term “glass ceiling” usually refers to highly qualified women in the business world who face discrimination because of sexism as they attempt to climb the corporate ladder. The term can equally be applied to women who have chosen a career in science (Rosser, 2004).

In the first half of the twentieth century, women were discouraged from pursuing a science career. Given the social atmosphere

prevailing then, few women were resilient enough to challenge the status quo. Often parents were opposed to their daughters’ even obtaining a higher education. For those young women going to college, the more popular programs were elementary or secondary education or a nursing degree. Therefore, to overcome the hurdles of pursuing a career in science, a young woman needed to have the attributes of persistence, tenacity, a high degree of independence and, of course, a scientifically bent mind.

NOBLES WON AND DENIED

Often, women had to endure humiliating experiences because of the social mores and attitudes of the day. Rosalind Franklin, who faced such a situation, was a young X-ray crystallographer who accepted a research position at prestigious King’s College, London in 1951. At that time, only males were allowed in the university dining halls, and after hours Franklin’s colleagues would then gather at men-only pubs.

Four Jewish women who overcame the obstacles they encountered seeking a career in research attained the epitome of success by ultimately receiving the Nobel Prize in Physiology or Medicine. They were Gerty Cori (1947), Rosalyn Yalow (1977), Rita Levi-Montalcini (1986) and Gertrude Elion (1988). Two others, Lise Meitner and Rosalind Franklin, were denied the Nobel Prize although there is strong evidence that each should have shared the prize with colleagues. The careers of these two will be presented elsewhere.

GERTY CORI

Gerty Cori was the first Jewish woman to receive a Nobel Prize. On March 6, 2008, the United States issued a stamp honoring her along with three other American scientists. A portrait of Cori is shown alongside the Cori ester, a chemical formula, which she and her husband, Carl Cori, discovered. The formula contains an error (Miller, 2008), which would probably only be detected by biochemists.

Gerty Theresa Radnitz was born on August 15, 1896 to an upper-middle class Jewish couple, Otto and Martha Radnitz, in

Prague, then part of the Austro-Hungarian Empire. Otto was the manager of sugar refineries. Gerty received her primary education from tutors at home before entering a lyceum for girls at age ten. In those days, girls’ schools were not nearly as challenging as those for boys; they often paid more attention to teaching girls how to be proper young ladies than to nurturing their minds.

Girls were certainly not expected to attend university. However, Gerty had different ideas. She definitely had an inclination to study chemistry and medicine, attending a technical gymnasium where she studied college preparatory subjects in science and mathematics before entering medical school at the German University in Prague in 1914. There she fell in love with one of her classmates, Carl Cori, whom she married in 1920 after both received their medical degrees. Gerty Cori converted to Catholicism, the religion of her husband. In 1922 they immigrated to the United States and became naturalized citizens in 1928.

Their first positions in the United States were at the Roswell Park Memorial Institute, Buffalo, New York, Gerty as an assistant pathologist and Carl as a biochemist. Although discouraged from collaborating in research, they did so anyway. After publishing a significant number of research papers together and independently, the Coris decided to apply for university positions. Carl was offered a number of positions, but Gerty received no offers at first. Finally, in 1931, Washington University School of Medicine, St. Louis, Missouri, offered Carl a tenured professorship in biochemistry and Gerty only a position as a research assistant, despite her stellar research and publishing record. With persistence, however, she rose to full professor in 1957.

Gerty and Carl Cori collaborated throughout their research careers. They performed pioneering research on how the body stores and uses sugars and other carbohydrates. For this work they shared the Nobel Prize in Medicine in 1947 with Bernardo Houssay of Argentina.

ROSALYN (SUSSMAN) YALOW

On Dec. 29, 1995, Sierra Leone issued a souvenir sheet featuring nine women Nobel laureates. Portraits of Rosalyn Yalow and Rita Levi-Montalcini are seen on Scott 1844e and 1844g, respectively.

Rosalyn Sussman was born on July 19, 1921, in New York City to Simon and Clara Zipper Sussman. She attended Walton High School in the Bronx. Her parents thought that a desirable career for their daughter would be as an elementary school teacher. Rosalyn, however, had her sights on a career in science, and she studied physics at Hunter College, the woman’s college in the (now) City University of New York.

Upon graduation from Hunter in January 1941, she had



Sierra Leone issued a souvenir sheet on Dec. 29, 1995 (Scott 1844a-i) commemorating nine women Nobel laureates. The Jewish Nobelists in medicine are e. **Rosalyn Yalow** and g. **Rita Levi-Montalcini**. The other laureates are

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| a. Maria Goeppert Mayer, physics; | f. Dorothy Hodgkin, chemistry; |
| b. Irene Joliet-Curie, chemistry; | h. Mairéad Corrigan, peace; |
| c. Mother Teresa, peace; | i. Betty Williams, peace; |
| d. Selma Lagerlof, literature. | |



On March 6, 2008 the United States issued four stamps commemorating American scientists: biochemist **Gerty Cori**, chemist Linus Pauling, astronomer Edwin Hubble and physicist John Bardeen

few opportunities to go to graduate school, so she entered business school and took a position as a secretary at Columbia University's College of Physicians and Surgeons. This job was supposed to be a back-door entrance to graduate courses. However, to her surprise, in mid-February 1941, she received a teaching assistantship in physics at the University of Illinois in Champaign. The position became available to a woman because most qualified men were being drafted even prior to American entry into WW II.

In Yalow's autobiography published after she received the Nobel Prize in Medicine (1977), she described her first semester at Illinois where she sat in on two undergraduate physics courses and took three graduate courses for credit. In the latter courses she received A's in two and an A in the lecture half of one course, with an A- in its laboratory. The prevalent bias against women in science at that time was revealed by the comments of the chairman of the Physics Department: "That A- confirms that women do not do well at laboratory work." That more than subtle discrimination certainly did not deter her from her research program, since she became the second woman to receive a Ph.D. degree in physics from the University of Illinois in 1945. She also met a fellow physics graduate student, Aaron Yalow, who became her husband in 1943.

After completing her Ph.D., she joined the Veterans Administration Hospital in the Bronx to do research with radioisotopes. Over several years, she collaborated with Solomon Berson to develop the radioimmunoassay (RIA) methodology, first applied to measuring circulating insulin and later other hormones. For this research, Yalow shared the Nobel Prize in Medicine in 1977 with Andrew Schally and Roger Guillemin. Unfortunately, Berson had died in 1972, so he was not eligible to share the Nobel Prize posthumously.

RITA LEVI-MONTALCINI

Rita Levi-Montalcini and her twin sister Paola were born on April 22, 1909 in Turin, Italy to Sephardic Jewish parents, Adamo Levi, an electrical engineer and mathematician and Adele Montalcini, a talented painter. Her father decided that Rita and her two sisters would not go to university because a professional career would interfere with the duties of a wife and mother.

Despite her father's objections, Levi-Montalcini enrolled in the University of Turin Medical School, graduating summa cum laude in 1936, and then completed a degree in neurology and psychiatry in 1940. She was forced out of a position at the University of Turin when Benito Mussolini barred Jews from academic careers. During WW II, she conducted experiments from a home laboratory, first in Turin, then in the family's country cottage, and finally in Florence, where they lived in hiding until the end of the war.

After the war, she returned to an academic position at the University of Turin. In 1947 she was invited for a semester to study at Washington University in St. Louis, Missouri. She stayed for thirty years, becoming a full professor in 1958. Here she did her most important research, isolating nerve growth factor (NGF). In 1986 Levi-Montalcini and Stanley Cohen shared the Nobel Prize in Medicine for this work.



United States stamps related to the fight against cancer (Scott 1263, April 1, 1965) and AIDS awareness (Scott 2806, Dec.1, 1993). **Gertrude Elion** developed drugs to treat cancer and AIDS.

GERTRUDE BELLE ELION

Gertrude Belle Elion was the fourth Jewish woman to capture the Nobel Prize in Medicine. She shared the prize in 1988 with her collaborators George Hitchings and Sir James Black for the development of rational methods for drug design and discoveries in the principles of cancer chemotherapy.

Gertrude was born on January 23, 1918 in New York City to Robert and Bertha (Cohen) Elion who had immigrated from Lithuania and Russia, respectively. Her father had completed dental school at New York University (NYU), but he had lost all his money in the stock market crash of 1929. Gertrude grew up in the Bronx, New York.

At an early age she became interested in science, which was motivated by the loss of her grandfather to cancer. Like Rosalind Yalow, she was fortunate to receive a free higher education at Hunter College, graduating in 1937. Because of gender discrimination, 15 graduate schools rejected her applications for graduate assistantships. Her attempt to find a job also encountered roadblocks, as industry was not interested in hiring a woman chemist. She did land a non-paying laboratory assistant position where she eventually earned \$20.00 a week. After a couple of years, she saved enough money and with assistance from her parents, was able to enter graduate school at NYU, earning her Master of Science in chemistry in 1941.

The shortage of male chemists due to WWII enabled her to land a job as a food chemist in 1942. While she learned much about instrumentation, the work became very repetitive for someone as ambitious as Elion. Luckily, George Hitchings at Burroughs Wellcome, a pharmaceutical company, hired her as a research chemist in 1949. From then on, her research career blossomed.

She and her colleagues developed many therapeutic drugs, including 6-mercaptopurine for treating childhood leukemia; Imuran, the first immuno-suppressive agent used for organ transplants; AZT, one of the first drugs used to treat AIDS; and acyclovir for viral herpes. Elion became the first woman to lead a major research group at Burroughs Wellcome. She died on February 21, 1999.

CONCLUSION

The exemplary research careers of these four scientists serve as a model for young women pursuing a career in science. In today's environment, the hurdles women face are not nearly as difficult,

but the work required to attain a successful research career is just as demanding.

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